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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/573,908	12/18/2006	Robert Drake	MSP638PCT/071038.00364	2127

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EXAMINER	
MURATA, AUSTIN	

ART UNIT	PAPER NUMBER
1712	

MAIL DATE	DELIVERY MODE
03/09/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/573,908	DRAKE ET AL.	
	Examiner	Art Unit	
	AUSTIN MURATA	1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *2/7/2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,11-16 and 18-22* is/are pending in the application.

4a) Of the above claim(s) *19 and 20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,11-16 and 18-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2/7/2011*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This action is nonfinal.

Information Disclosure Statement

Examiner was unable to consider referenced "000000" in IDS dated 6/1/2010, as no such reference exists. It is assumed that this is a typographical error.

Response to Amendment

Amendments to claims entered 2/7/2011 have been entered and fully considered. Claim 22 is new. Claims 19 and 20 are withdrawn. Claims 9, 10 and 17 are cancelled.

Response to Arguments

The examiner maintains that one of ordinary skill in the art would apply the polysiloxane film of CLEM using the method of BAO. Applicant correctly points out that CLEM never teaches printing a preformed polysiloxane. However the examiner maintains that one of ordinary skill in the art could attempt to create the polysiloxane patterned film formed by CLEM by the method of BAO.

Applicant argues that the problem with printing preformed polysiloxanes is the low surface tension which causes undesired spreading on the substrate when the ink is printed. The applicant further asserts that the issue of undesired spreading is not the concern of BAO which is focused on mold release and pattern definition. However the examiner asserts that undesired spreading of the ink is part of the issue of pattern definition.

Applicant further argues because BAO teaches plasma treating a surface prior to applying **any** polymer ink there is no indication it would work for silicon-containing polymers. The examiner respectfully disagrees and interprets the generic polymer ink layer to include silicon-containing polymer. The reference does not specifically indicate any polymers not working therefore there is no reason to not expect any particular polymer not to improve adhesion to the substrate.

Applicant also argues that because BAO teaches using silanes to lower the surface energy of the stamp's surface one of ordinary skill in the art would recognize the problem of micro-contact printing a low surface energy silicon-containing polymer. Applicant further points out that the surface energies of the polymers mentioned for use in BAO are relatively high when compared to polysilane. The examiner respectfully points out that the improvements in the patterning provided by BAO are independent of the surface tension of the polymer applied and therefore a polymer of any surface tension could be applied. The relatively high and low surface energies of the protrusions and recesses of the stamp are what cause the improvement in patterning. The different surface energies of the surface modified stamp will inherently cause different wetting to occur when the polymer is applied which improves the deposition.

Applicant further points out that CLEM does not teach applying a silicon containing polymer by microcontact printing but only teaches using a monomer form. However it would still be obvious to make the polymer blocking layer of CLEM using the method of BAO because it produces a polymer with a higher dry etch resistance than a SAM layer, see BAO **[0049] and [0005].** An example of such etch resistant polymer is

silicon-containing polymer **[0096]**. Therefore at the time of the invention it would have been prima facie obvious to one of ordinary skill in the art to provide the blocking layer (of polysiloxane) of CLEM using the deposition method of BAO to improve dry etch resistance. The printing of a premade polymer is expressly taught as a superior method of applying a mask layer when compared to microcontact printing a SAM (self assembled monolayer).

Regarding claim 6,

Applicant further argues the references fail to teach introducing an atomoized liquid or solid coating material into an atmospheric pressure plasma discharge. The examiner notes that BAO teaches applying corona treatment and chemical primer to the surface of the substrate to improve adhesion **[0080]**. The references fail to teach applying the chemical primer layer as an atomized liquid or solid. However, BAO specifically points to BROWN et al. (US 3,578,622) as an example of a chemical primer and the reference teaches spraying (atomizing) the chemical primer **column 1 lines 59-61**. Therefore BROWN is now included in the rejection below.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-5, 7-8, 11-13, 15, 16, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over BAO et al. (US 2004/0231781) in view of CLEM et al. (US 6,518,168)

Regarding claim 1,

BAO et al. teaches in the abstract, “method of creating patterns on substrates” (method of applying a patterned thin-film onto a substrate). The reference further teaches corona treatment utilized on the substrate, paragraph **[0080]** (plasma treating the substrate). BAO et al. also teaches printing polymers, that may be thermoplastic, thermosetting, thermoplastic elastomer, and may be crosslinked, crosslinkable, or non-crosslinked, paragraph **[0071]** (a variety of polymers can be utilized). The reference also teaches the same “soft lithographic printing technique” described in paragraph **[0045]**, lines 15-19, of the instantly disclosed specification by providing a transfer member with protusions and recesses paragraph **[0012]**, and using the protrusions to print a pattern onto the substrate see **figure 1**. The method of BAO et al. does not require removal of residual liquid from the substrate surface as the step is not included. Due to the polymer ink already being polymerized before deposition onto the substrate, a curing step is not required.

The reference teaches using a silicon containing polymers **[0096]** but does not expressly teach using organopolysiloxane polymers, organopolysiloxane oligomers, siloxane resins and polysilanes.

However, CLEM et al. teaches using a similar micro-printing process for depositing alkylsiloxane **column 14 lines 44-45** and octadecyltrichlorosilane **column 21 lines 43-44**, self assembled monolayers onto a substrate.

At the time of the invention it would have been *prima facie* obvious to one of ordinary skill in the art to make the blocking layer of CLEM using the method of BAO

because, “This polymer inking technique has several advantages over other high throughput patterning techniques such as μCP and NIL,” see BAO **[0049]**.

Regarding claim 2,

CLEM et al. teaches in column 9 lines 63-66, “heights of features formed on surfaces in accordance with the invention of the above dimensions can be achieved as well, including an embodiment with lines of height smaller than 0.08 micron” (patterned thin-film has a thickness in the region of from 1 to 100 nm.

Regarding claim 3,

BAO et al. teaches in paragraph **[0080]** corona treating the substrate (wherein step (i) is carried out utilizing a suitable source selected from the group of a corona discharge source).

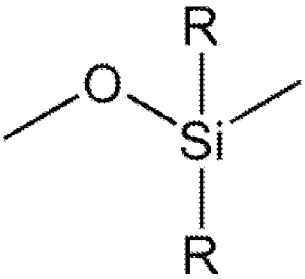
Regarding claim 4,

CLEM et al. expressly teaches using glass (glass) and polar polymeric surface (plastic) in column 14 line 59. BAO et al. teaches using metals, semiconductors, dielectrics and polymers, pargraph **[0076]**.Regarding claim 5,

BAO et al. teaches a pretreating step of a chemical primar layer or a corona treatment layer, paragraph **[0080]**.

Regarding claim 7,

CLEM et al. teaches using an alkylsiloxane which is a monomer with a Si-O backbone with an alkyl (carbon chain) attached as an R group, see illustration. Polymerization of the monomer would inherently be linear or cyclic.



Regarding claim 8,

CLEM et al. teaches using alkylsiloxane but does not expressly teach the alkyl (hydrocarbon chain) group being between 1 and 40 carbon atoms. However, teaching an alkyl group but not teaching the exact carbon chain length teaches chain lengths between CH_3 to $C_nH_{(2n+1)}$ which overlaps with the range of between 1 and 40 carbon atoms. The overlap of ranges is considered a *prima facie* case of obviousness MPEP 2144.05 I. At the time of the invention one of ordinary skill in the art would have understood that an alkyl group could consist of a carbon chain between 1 and 40 carbon atoms.

Regarding claim 11,

BAO et al. teaches a very similar process as the printing process described in the instantly disclosed specification paragraph [0045] as it uses a stamp-like applicator to imprint patterns onto a substrate where the protrusions contact the substrate, see BAO et al. figure 1.

In addition, CLEM et al. teaches the same "soft lithographic printing technique" described in the instantly disclosed specification in paragraph [**0045**]. CLEM et al. figure **1*a***, "a surface **12** at least outward facing portions **16** thereof, coated with a self-assembled monolayer (SAM) forming species **17**. When the applicator is applied to the

substrate **18** and removed, a SAM is formed at regions **20** of the substrate contacted by outward facing surfaces **16**."

Regarding claims 12 and 15

CLEM et al. teaches in column 20 lines 27-29, "a stamp including protrusions of parallel lines was first applied to the surface, removed and rotated 90°, and reapplied" (an additional coating is applied to form a second layer on the patterned film) (using a soft lithographic printing technique).

Regarding claim 13,

The combination of BAO et al. and CLEM et al. teaches the limitation of claim 1 but does not teach the process being continuous, however making a process continuous is not a patentable feature, see MPEP 2144.04 V(E).

Regarding claim 16,

CLEM et al. teaches using alkylsiloxanes, column 14 line 51, as the material being patterned on the substrate. Polymerized or not, the alkyl group is a saturated hydrocarbon chain (nonpolar) which will make the patterned left on the substrate hydrophobic.

Regarding claim 21,

CLEM et al. teaches in column 2 line 36-38, applying a blocking agent pattern and material is deposited in a pattern complementary to the blocking pattern. (a region of the substrate surface is masked to substantially prevent or inhibit further physical or chemical changes to the previously uncoated, partially coated or fully coated substrate surface during a process step).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over BAO et al. (US 2004/0231781) and CLEM et al. (US 6,518,168) as applied to claim 1 in further view of SPENCE (US 6,083,355) and BROWN et al. (US 3,578,622).

Regarding claim 6,

BAO teaches applying corona treatment and chemical primer to the surface of the substrate to improve adhesion **[0080]**, but does not expressly teach the process occurring at atmospheric pressure or applying the primer that is atomized.

However, SPENCE teaches in **column 1 lines 39-41**, that corona treatment can be done at atmospheric pressure when plasma treating polymer films.

At the time of the invention, it would have been *prima facie* obvious to one of ordinary skill in the art to use an atmospheric form of corona treatment because it is an economical means for surface modification, **column 1 lines 44-45**.

The reference further does not teach applying the chemical primer layer as an atomized liquid or solid. However, BAO specifically points to BROWN et al. (US 3,578,622) as an example of a chemical primer and the reference teaches spraying (atomizing) the chemical primer **column 1 lines 59-61**. Therefore applying the chemical primer of BAO by spraying would be a combination of known prior art methods obtaining a predictable result which is an adhesive layer MPEP 2143 A.

Claims 14 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over BAO et al. (US 2004/0231781) and CLEM et al. (US 6,518,168) as applied to claim 1 in further view of NOMURA et al. (US 2003/0211342).

Regarding claims 14 and 18,

The combination of BAO et al. and CLEM et al. teaches creating the patterned layer of claim 1, but does not expressly teach using the pattern to modify the alignment of liquid crystal.

However, NOMURA et al. teaches that it is known in the art to use siloxane and silane compounds in thin films to modify the properties of liquid crystal alignement, paragraph [0023].

At the time of the invention it would have been *prima facie* obvious to one of ordinary skill in the art to use the silane and siloxane elements as a patterned layer for modifying liquid crystal alignment because the modifications are resistant to degradation, NOMURA et al. paragraph [0023].

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over BAO et al. (US 2004/0231781) in view of CLEM et al. (US 6,518,168) and CHIEN (US 2006/0093845).

Regarding claim 1,

BAO et al. teaches in the abstract, “method of creating patterns on substrates” (method of applying a patterned thin-film onto a substrate). BAO et al. also teaches printing polymers, that may be thermoplastic, thermosetting, thermoplastic elastomer, and may be crosslinked, crosslinkable, or non-crosslinked, paragraph **[0071]** (a variety of polymers can be utilized). The reference also teaches the same “soft lithographic printing technique” described in paragraph **[0045]**, lines 15-19, of the instantly disclosed specification by providing a transfer member with protusions and recesses paragraph **[0012]**, and using the protrusions to print a pattern onto the substrate see **figure 1**. The

method of BAO et al. does not require removal of residual liquid from the substrate surface as the step is not included. Due to the polymer ink already being polymerized before deposition onto the substrate, a curing step is not required.

The reference teaches using a silicon containing polymers **[0096]** but does not expressly teach using organopolysiloxane polymers, organopolysiloxane oligomers, siloxane resins and polysilanes.

However, CLEM et al. teaches using a similar micro-printing process for depositing alkylsiloxane **column 14 lines 44-45** and octadecyltrichlorosilane **column 21 lines 43-44**, self assembled monolayers onto a substrate.

At the time of the invention it would have been *prima facie* obvious to one of ordinary skill in the art to make the blocking layer of CLEM using the method of BAO because, "This polymer inking technique has several advantages over other high throughput patterning techniques such as μCP and NIL," see BAO **[0049]**.

The reference further teaches corona treatment utilized on the substrate, paragraph **[0080]** (plasma treating the substrate) but does not teach plasma applied as atmospheric pressure glow discharge. However, CHIEN teaches corona treatment for improved adhesion of a surface can be corona, corona discharge or atmospheric pressure glow discharge **[0107]**. At the time of the invention it would have been prima facie obvious to one of ordinary skill in the art to use atmospheric pressure glow discharge instead of corona treatment as a simple substitution of known plasma treatments for improving adhesion of a surface.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AUSTIN MURATA whose telephone number is (571)270-5596. The examiner can normally be reached on Monday through Friday 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MICHAEL CLEVELAND can be reached on (571)272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/AUSTIN MURATA/
Examiner, Art Unit 1712

/Michael Cleveland/

Supervisory Patent Examiner, Art Unit 1712